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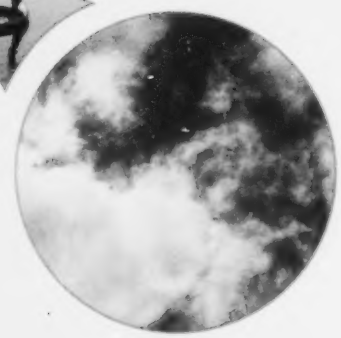

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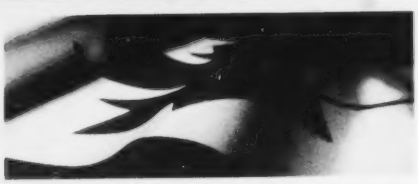

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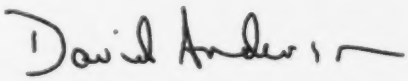
Minister's Message to Canadians

The Government of Canada's vision for a sustainable, more livable Canada is a country where governments and citizens make decisions that balance economic, social and environmental objectives. To achieve this vision we need a clear understanding of the current environmental challenges facing Canadians and the progress being made in addressing them. That is why this government has committed to regular reporting on environmental issues of importance to Canadians and has produced reports such as *Environmental Signals: Headline Indicators 2003* and its companion report *Environmental Signals: Canada's National Environmental Indicator Series 2003*. It is also why we are supporting the work of the *National Round Table on the Environment and the Economy (NRTEE)* to identify a core set of sustainable development indicators and why we are working towards the development of a comprehensive environmental information system for Canada as recommended by the *Canadian Information System for the Environment (CISE) Task Force* in October 2001.

Two years ago, Environment Canada released *Tracking Key Environmental Issues*, providing Canadians with easily accessible information about the state of the environment. These two *Environmental Signals* reports provide the next step in this series. We have made significant progress over the past two years, but clearly there is much more to do. Several of the indicators in *Environmental Signals* point toward improvements in the state of our environment. Other indicators highlight significant challenges where we need to be diligent in our efforts to reduce pressures on the environment or improve the condition of our ecosystems. For many of the indicators, the results are mixed. The Government of Canada, in partnership with all sectors of society, will continue to strive to maintain and improve Canada's natural environment.

Environmental Signals also provides baseline information to support and complement the core set of high-level indicators being developed by the NRTEE and scheduled to be released in a report later this year. Our ability to report on these sustainable development indicators and to ensure we fully understand what environmental changes are occurring is dependent on the availability of consistent, reliable, and accessible information. That is why we will continue our efforts in collaboration with provincial, territorial and other partners to further the develop a Canadian Information System for the Environment (CISE). It is my hope that as CISE unfolds it will become increasingly easy for organizations and communities to seek out environmental information and compile their own, locally relevant, environmental indicator reports.

I hope you will find *Environmental Signals: Headline Indicators 2003* and *Environmental Signals: Canada's National Environmental Indicator Series 2003* helpful and informative, and I invite you to provide your comments on both reports. Your thoughts can help us to provide all Canadians with more effective tools for understanding and responding to the environment.



The Honourable David Anderson, P.C., M.P.
Minister of the Environment

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For the online report visit http://www.ec.gc.ca/soer-ree/

For more detailed information, see *Environmental Signals: Canada's National Environmental Indicator Series 2003* at http://www.ec.gc.ca/soer-ree/

Introduction

Canadians recognize the importance of a clean and healthy environment. About 20% of the world's remaining natural areas, 7% of the world's renewable fresh water, and 25% of the world's remaining wetlands are found in Canada. Along with this endowment comes the responsibility for the wise management and preservation of these resources for current and future generations.

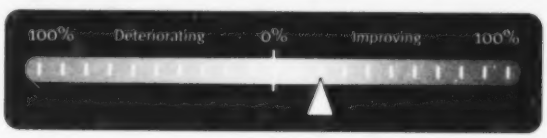
Human activity has profound effects on the environment. Canada's population has more than doubled in the last 50 years and economic growth has increased nearly seven-fold. Such growth places increasing demands on the environment for energy and materials, and creates a growing amount of waste and pollution for the environment to absorb. Canadians are among the world's highest per capita consumers of fossil fuels, releasing harmful pollutants that contribute to acid rain, smog, and climate change. High population density in certain regions of the country has negative impacts on local air and water quality, and natural spaces are increasingly being converted to residential and industrial areas.

This report contains a set of 12 key indicators, which we term "headline" indicators, that are intended to provide a broad overview of trends in Canada's environment in areas that are important to Canadians. The indicators do not represent a comprehensive report on the state of our environment, but rather are a series of snapshots that can raise public awareness and act as signposts for our path towards environmental sustainability. A more detailed analysis of these issues as well as background technical information can be found in the companion document, *Environmental Signals: Canada's National Environmental Indicator Series 2003* and on-line at http://www.ec.gc.ca/soer-ree/.

Nine themes are addressed: water use, wastewater treatment, air quality, climate change, acid rain, stratospheric ozone depletion, wildlife & wilderness, toxic substances, and waste & recycling. Within each theme, the report discusses what is happening and why it is important, ongoing challenges, what the Government of Canada is doing to address the issue, and linkages to other indicators relevant to the theme. The report also provides hints as to what individuals can do to reduce pressures on the environment for each issue area.

The Meter

An indictor identified as representative of each theme was selected. The trend over time for each of these headline indicators is assessed and presented using a meter, as shown below. The meter indicates whether the trend for the indicator is deteriorating, remaining stable, or improving, and to what extent. The meters do not allow comparisons of the relative importance of issues or set priorities for action and they do not necessarily show change with respect to specific science-based thresholds. The method for calculating the trend is provided in the references section in brief under each issue. More detailed calculations and background data can be found in the technical supplements for each issue on-line at http://www.ec.gc.ca/soer-ree/.



Indicator summary

Improving	→ Protected areas → Population served by secondary and tertiary wastewater treatment → Sulphur dioxide emissions
Mixed Signals	→ Daily municipal water use per capita → Ambient levels of ground level ozone, a component of smog → Stratospheric ozone layer thickness
Deteriorating	→ Greenhouse gas emissions → Generation of non-hazardous solid waste

Water Use

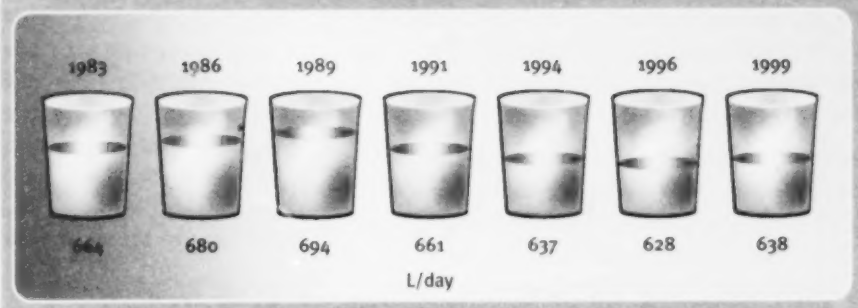
What is the issue?

Canada is a "water-rich" country, with 7% of the world's renewable water supply. Canadians are also among the highest per capita water users in the world. Water demand is rising and concentrated in the narrow strip of land close to the U.S. border where 90% of Canadians live. Intensive water use can disrupt natural aquatic ecosystems and lead to local shortages, such as those experienced in Prairie agricultural areas. High water use also creates high volumes of diluted wastewater, which is inefficient and costly to treat.[1]

What is happening?

There has been a small reduction in the volume of municipal water used per person since 1983. However, total municipal water use has risen significantly over the same time period, due to population growth. Residential water use accounts for more than half of all municipal water use in Canada.[3] Municipal water use represents only 11% of all water use in Canada, competing with agriculture, mining, manufacturing and power generation.

Daily municipal water use per capita[a]



Source: Adapted from Municipal Water Use Database (MUD), Environment Canada.[2]

Why is it important?

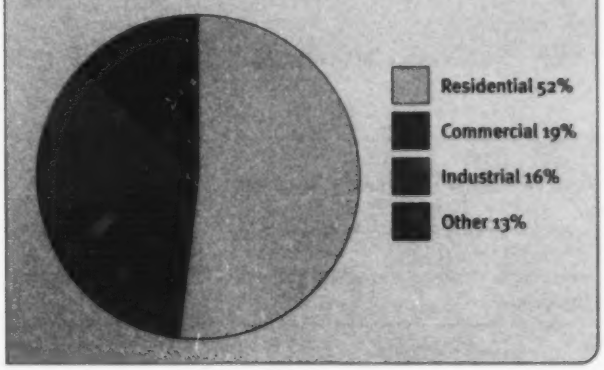
High water use places pressure on the quantity of Canada's freshwater supplies, particularly in urban areas. Using water wisely will reduce stress on our freshwater ecosystems, lower water costs, and extend the life of existing water supply and waste treatment facilities.

What you can do

Simple changes to reduce water use can add up to major savings. Here are some tips:

- **Install water saving devices in your home.**
- **Fix leaky taps. Many homes lose more water from leaking taps than they use for cooking and drinking.**
- **Water your lawn deeply but not often. Three cm. per week is usually enough.**

Municipal water users, 1999[b]



Source: MUD, Environment Canada.[4]

What the Government of Canada is doing

The federal government funds municipal projects for improved water efficiency and effective water pricing through the Green Municipal Funds program. It also encourages water conservation through public outreach programs.

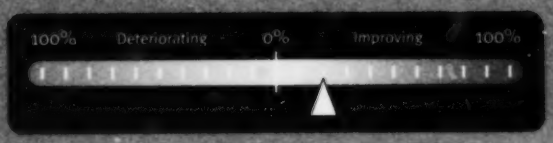
Challenge

To better reflect the cost of treating and supplying water in its price. Inappropriate pricing is one of the key factors leading to high rates of water consumption across Canada.

Related indicators

- Wastewater treatment (pg. 3)

Wastewater Treatment



What is the issue?

Although Canadians enjoy clean water compared to many other countries, pollution of our waters remains an important problem. **Water pollution has wide-ranging impacts on our health, our environment, and our economy** such as our fisheries and agricultural industries. In some local areas, people cannot eat the fish they catch or swim in lakes or rivers. Water quality in Canada is affected by many contaminants including **toxic substances, sediment, invasive alien species**, and **nutrients** and **bacteria** from fertilizers and wastewater. Municipal wastewater remains one of the largest sources of pollution, by volume, to Canadian waters.

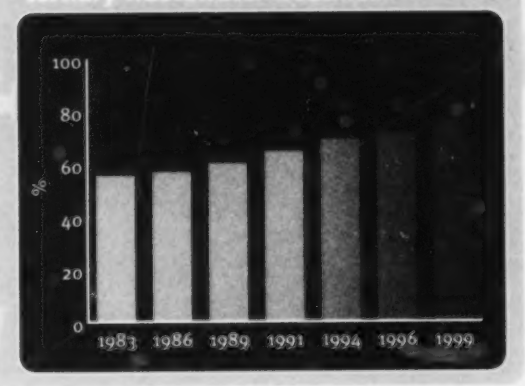
What is happening?

More wastewater is being treated to remove nutrients, solids, and toxics now than in the past. Many of our wastewater treatment systems are not able to remove all of the chemicals and pollutants that we produce and use today.

Why is it important?

Untreated or poorly treated wastewater effluents degrade the quality of Canadian estuaries, lakes and rivers and harm aquatic life. Drinking and recreational water contaminated with wastewater can be dangerous to human health, as can be the consumption of contaminated fish and shellfish.[2] As the level of wastewater treatment increases, the volume of wastewater contaminants released to our waters decreases.

Population[b] served by secondary and tertiary wastewater treatment



Source: Municipal Water Use Database (MUD), Environment Canada.[1]

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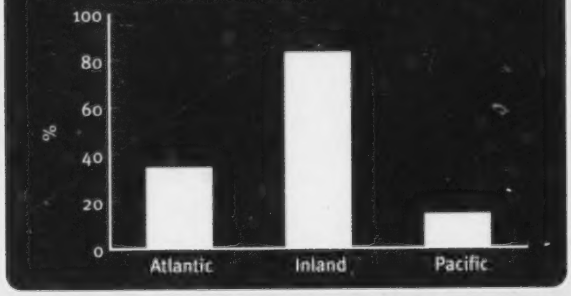


Source: MUD, Environment Canada.[4]

What you can do

Never dump pesticides, paints, solvents, and pharmaceuticals down the drain or storm sewer. Check with your municipality on proper recycling or disposal methods.

What the Government of Canada is doing

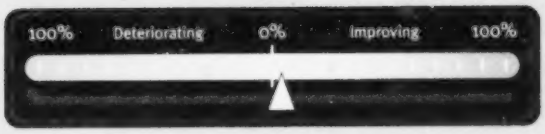
The Government of Canada is putting measures in place to prevent the release of toxic substances in municipal wastewater effluents. It is partnering with the provinces, territories and municipalities to strengthen national water quality guidelines, monitor water quality, and research ways to prevent pollution and reduce its impact on our water. The Green Municipal Funds and the Infrastructure Canada Program, established by the federal government, have provided funding to assist with improvements to wastewater treatment systems across Canada.[3]

Challenge

More wastewater needs to be treated to further reduce the amount of pollution entering the environment. Work needs to be done to understand and reduce the impact of other sources of water pollution.

Related indicators

- Emissions of selected toxic substances (pg. 12)
- Daily municipal water use per capita (pg. 2)



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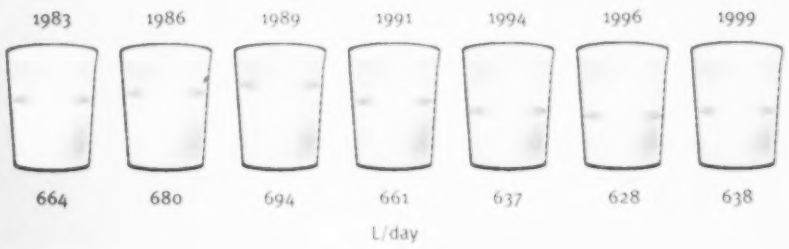

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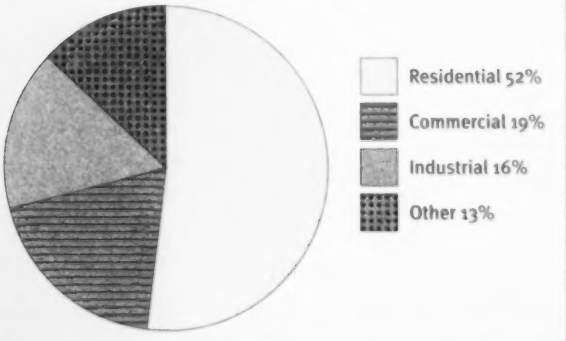

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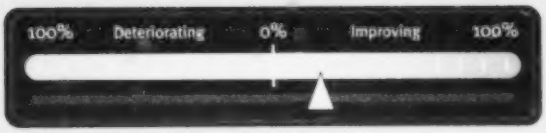

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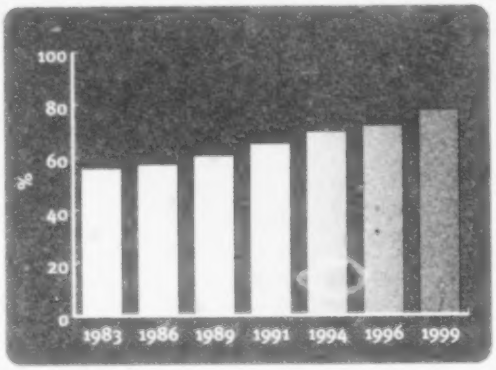

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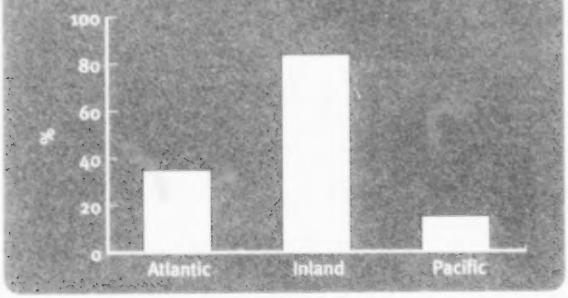

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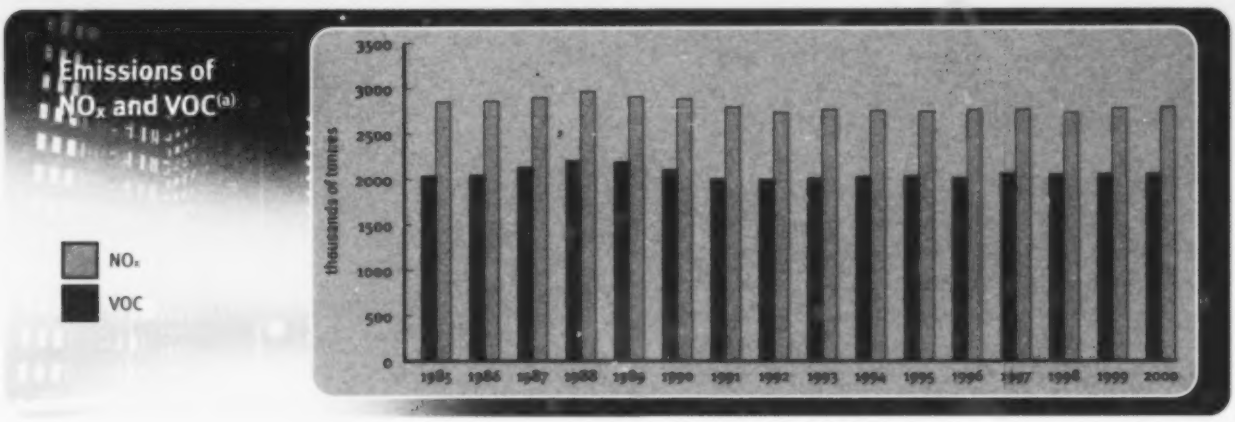
Air Quality

What is the issue?

Air quality is a local and regional issue affected by human activities, weather, and topography. **The quality of the air we breathe affects our health.** It also affects Canada's wildlife habitat and agricultural and forest yields. One important type of air pollution is smog, which mostly consists of ground-level ozone and microscopic airborne particles, known as particulate matter (PM). Ground-level ozone and over half of PM are produced through the reaction of other pollutants in the air, called precursor gases. **Nitrogen oxides (NO_x) and volatile organic compounds (VOC)** are two of the key precursor gases. Precursor gases come from human activities, such as burning fossil fuels in motor vehicles, smelters, homes, thermal power plants and other industries and the evaporation of solvents, as well as natural sources.



Source: Pollution Data Branch, Environment Canada.[1]

What is happening?

The emissions of NO_x and VOC have remained relatively constant for the past 15 years. More work needs to be done to reduce emissions of these gases from all human sources.

Why is it important?

Precursor gases can adversely affect human health directly and indirectly through the creation of smog-forming ground level ozone and PM. At high levels, NO_x can impair lung function and irritate the respiratory system. NO_x also contributes to the formation of acid rain. Some VOC are carcinogenic. Many of the same sources that emit NO_x and VOC emissions are also responsible for toxic and greenhouse gas emissions.

PM is measured in three categories: particles less than 2.5 micrometres ($PM_{2.5}$), particles less than 10 micrometres (PM_{10}) and total particles. Of the three, $PM_{2.5}$ is the most dangerous to human health because it is inhaled the most deeply into the lungs.

What you can do

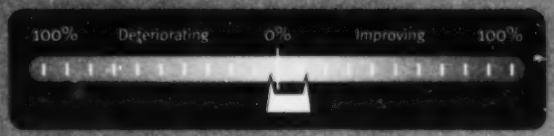
- **Keep your car and furnace properly tuned.**
- **Reduce use of wood burning stoves or use an advanced-combustion wood stove.**
- **Avoid idling your vehicle's engine.**
- **Use public transit, carpool, cycle or walk rather than drive.**
- **Listen for smog advisories and other air quality information. People with cardiac and respiratory problems, including asthma and bronchitis, should pay particular attention to air quality advisories.**

Sources of $PM_{2.5}$ from human activity[2]

Most $PM_{2.5}$ emissions come from burning fuels for:

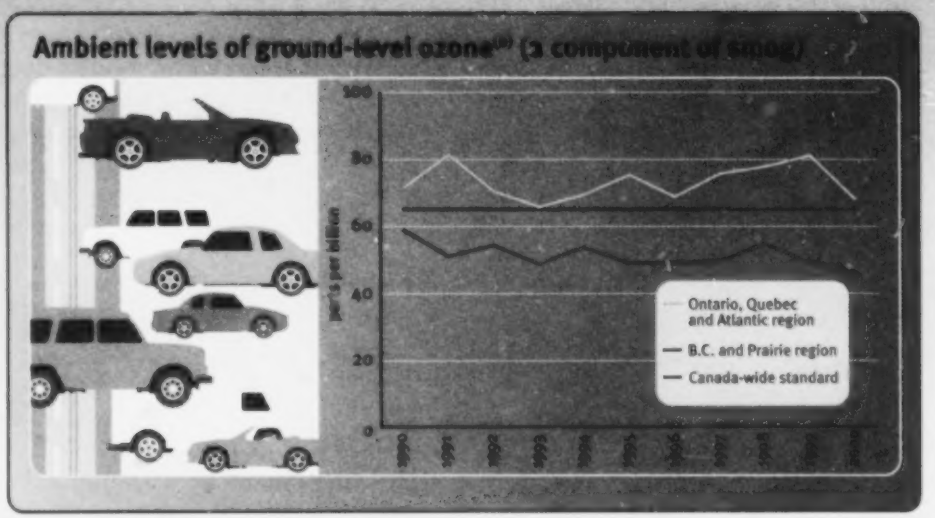
- Industry
- Residential heating
- Transportation.

Road dust and agriculture also contribute significantly.



What is happening?

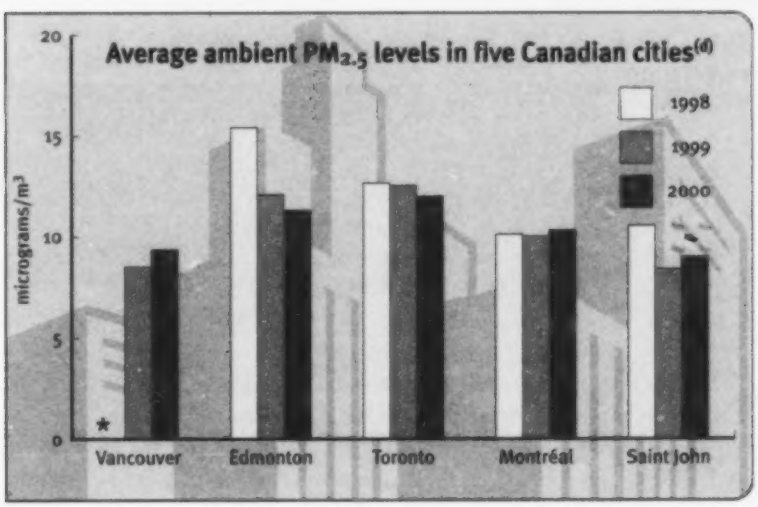
The ambient concentrations of ground-level ozone have not changed significantly. Eastern Canada experiences higher levels of ground-level ozone than Western Canada. Considerable variation in air pollution trends is observed among cities. Weather conditions have a strong influence on the year to year variations in ozone with higher concentrations under hotter conditions.



Source: National Air Pollution Surveillance Network.[3]
Note: The numerical level of the Canada-wide standard is included for qualitative purposes only.(c)

Why is it important?

Smog can irritate the eyes, nose and throat and cause coughing and wheezing. Poor air quality can also aggravate heart and lung diseases. Children, the elderly, and people with respiratory diseases are particularly at risk. However, poor air quality affects everyone.



Source: National Air Pollution Surveillance Network.[4]
Note: Natural sources also contribute to elevated PM2.5 levels.
**No data available.*

What the Government of Canada is doing

As part of the Clean Air Strategy, in 2001 the Government of Canada committed $120 million toward new measures that accelerate action on clean air. These new measures are detailed in the Ozone Annex to the 1991 Canada/US Air Quality Agreement. The focus is on promoting cleaner vehicles and fuels, reducing emissions from industry, and improving pollutant monitoring and reporting. In cooperation with the provinces and territories, the Government of Canada has endorsed Canada-wide standards for $PM_{2.5}$, ground-level ozone, and other air pollutants.

Challenge

Although there have been improvements in the levels of airborne pollutants, many parts of Canada continue to experience poor air quality.

Related indicators

- Greenhouse gas emissions (pg. 6)
- SO_2 emissions (pg. 8)
- Emissions of selected toxic substances (pg. 12)

Air Quality

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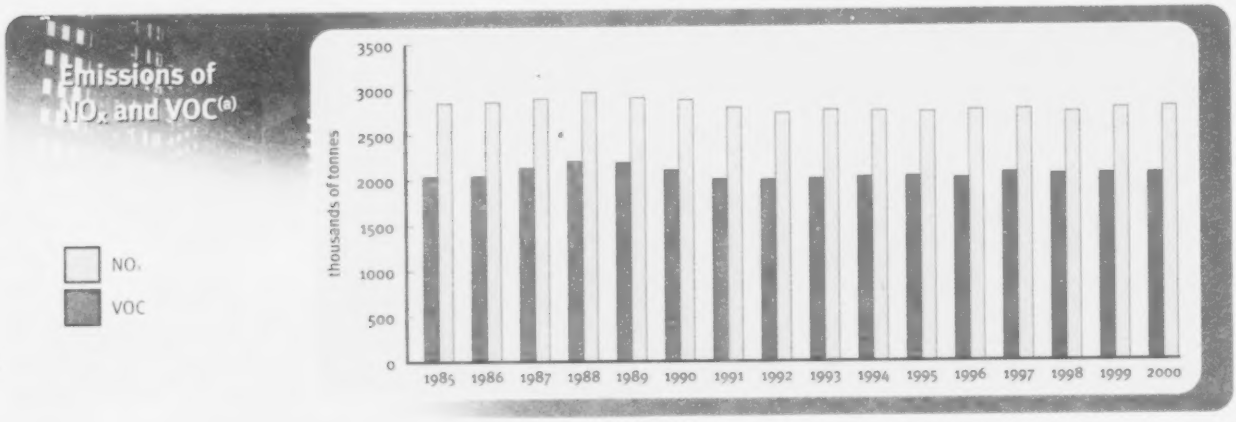

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- Keep your car and furnace properly tuned.
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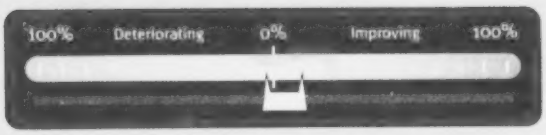
- Avoid idling your vehicle's engine.
- Use public transit, carpool, cycle or walk rather than drive.
- Listen for smog advisories and other air quality information. People with cardiac and respiratory problems, including asthma and bronchitis, should pay particular attention to air quality advisories.

Sources of $PM_{2.5}$ from human activity[2]

Most $PM_{2.5}$ emissions come from burning fuels for:

- Industry
- Residential heating
- Transportation.

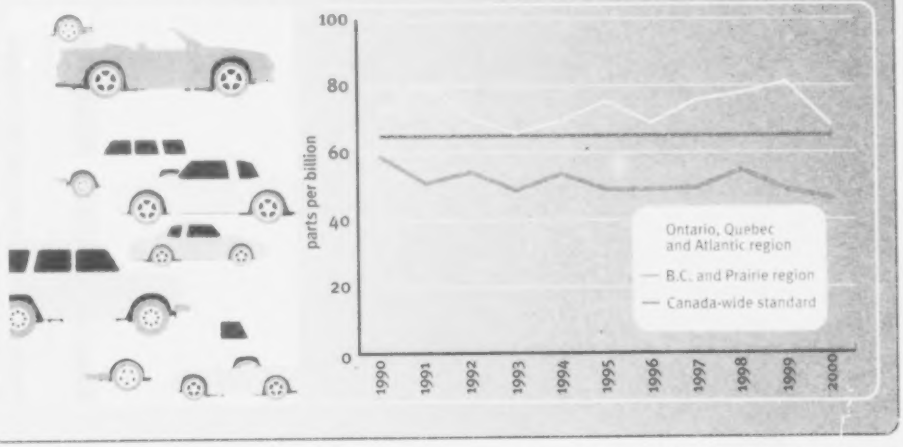
Road dust and agriculture also contribute significantly.



What is happening?

The ambient concentrations of ground-level ozone have not changed significantly. Eastern Canada experiences higher levels of ground-level ozone than Western Canada. Considerable variation in air pollution trends is observed among cities. Weather conditions have a strong influence on the year to year variations in ozone with higher concentrations under hotter conditions.

Ambient levels of ground-level ozone[b] (a component of smog)

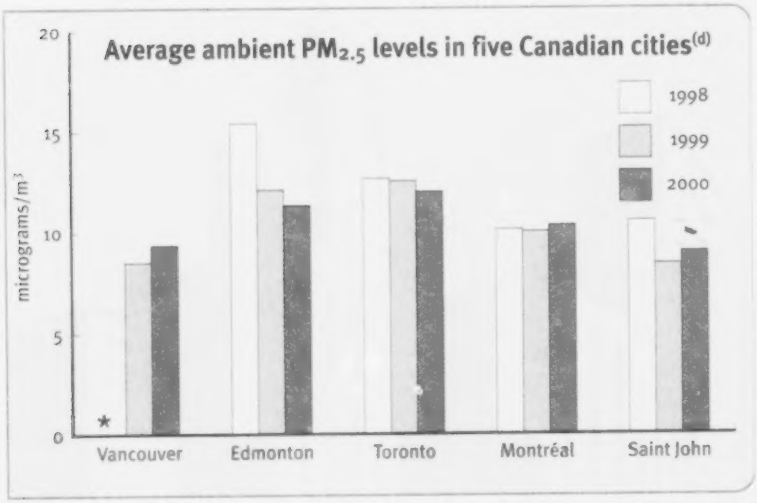


Source: National Air Pollution Surveillance Network.
Note: The numerical level of the Canada-wide standard is included for qualitative purposes only.

Why is it important?

Smog can irritate the eyes, nose and throat and cause coughing and wheezing. Poor air quality can also aggravate heart and lung diseases. Children, the elderly, and people with respiratory diseases are particularly at risk. However, poor air quality affects everyone.

Average ambient $PM_{2.5}$ levels in five Canadian cities[d]



Source: National Air Pollution Surveillance Network.
Note: Natural sources also contribute to elevated PM2.5 levels.
**No data available.*

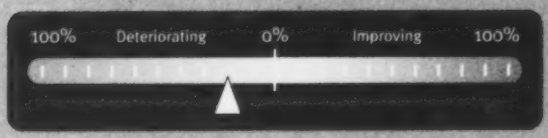
As part of the Clean Air Strategy, in 2001 the Government of Canada committed $120 million toward new measures that accelerate action on clean air. These new measures are detailed in the Ozone Annex to the 1991 Canada/US Air Quality Agreement. The focus is on promoting cleaner vehicles and fuels, reducing emissions from industry, and improving pollutant monitoring and reporting. In cooperation with the provinces and territories, the Government of Canada has endorsed Canada-wide standards for $PM_{2.5}$, ground-level ozone, and other air pollutants.

Challenge

Although there have been improvements in the levels of airborne pollutants, many parts of Canada continue to experience poor air quality.

Related indicators

- Greenhouse gas emissions (pg. 6)
- SO_2 emissions (pg. 8)
- Emissions of selected toxic substances (pg. 12)

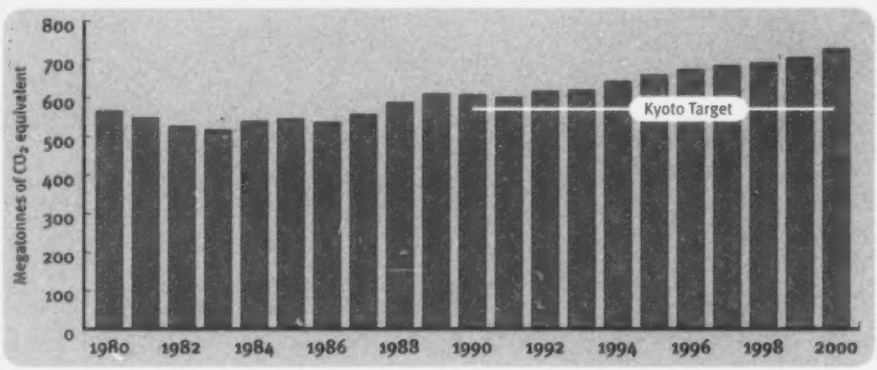


Climate Change

What is the issue?

Climate change is a shift in climate in response to any factor affecting the flow of energy through the Earth's atmosphere. Current interest is focused on the build-up of greenhouse gases (GHGs) which trap heat within the Earth's atmosphere. As a result, **the Earth's surface has warmed and will continue to warm, in turn producing other climatic changes, such as changes in rainfall, snow and ice cover, sea level and extreme weather events.** Human emissions of GHGs mostly come from burning of fossil fuels such as gasoline and coal.

Canadian greenhouse gas (GHG) emissions: Total Canadian emissions

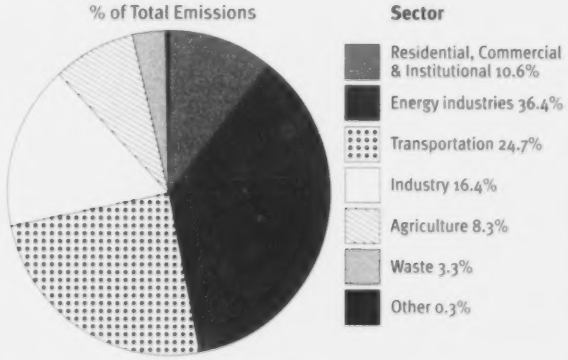


Source: Pollution Data Branch, Environment Canada.[1]

What is happening?

Canada's total GHG emissions have been rising since the early 1980s, largely due to increases in emissions from transportation and energy use. The 20% increase in Canada's GHG emissions over the past decade outpaced growth in population (11%) and total domestic energy consumption (17%). However, Canada has improved its GHG emission intensity by 9.1%, that is, fewer GHG emissions are produced for every GDP dollar.[3]

Greenhouse gas emissions by sector, 2000[a]



Source: Pollution Data Branch, Environment Canada.[2]

Why is it important?

Canada is among the highest per capita emitters of GHG in the world. Reducing GHG emissions will also help clean the air, reduce acid rain, and repair the stratospheric ozone layer. Eco-efficiency programs will contribute toward fewer emissions and will also benefit the economy.

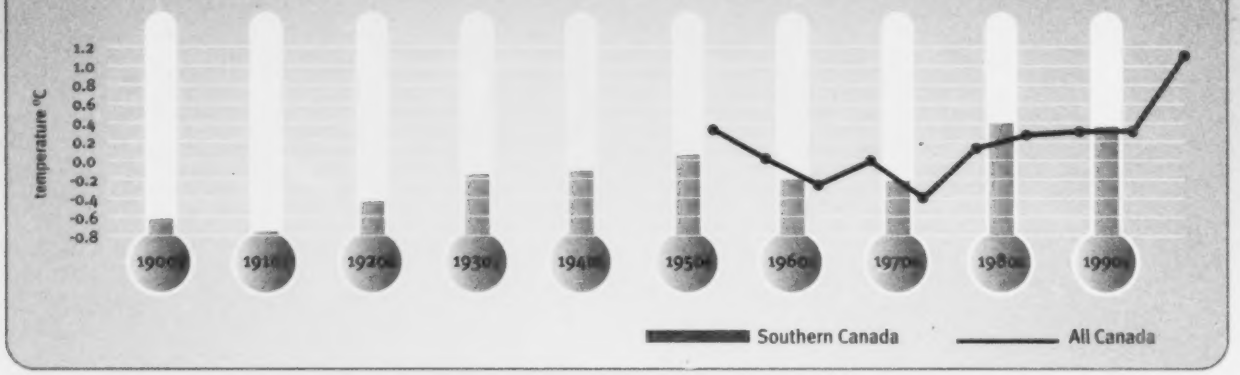
What you can do

- When buying a car, make fuel economy an important factor in your choice.
- Make sure your home is insulated properly.
- Keep your oil or gas furnace properly tuned.
- Pursue alternatives to single-occupant vehicle transportation.
- Work within your community to encourage better planning of urban transit, cycling routes and communities that are less dependent on cars.

Challenge

To decrease GHG emissions, further develop climate change science, and establish adaptation strategies.

Canadian temperature variations: Average temperature variation from a mean[b]



Source: Climate Research Branch, Environment Canada.[4]

What is happening?

The average temperature in Canada is increasing; in 2001, it was 1.7°C above normal. The most significant warming has been recorded in Canada's North.[5] The 10 warmest years since 1860 have all occurred in the past 15 years. Most experts agree that average global temperatures could rise by 1.4°C to 5.8°C over the next century.

Why is it important?

The effects of climate change will vary across Canada and affect our environment, our economy, and our health. Great Lakes water levels could fall by as much as 1m. Rising sea levels would flood low-lying coastal areas. Higher temperatures would heighten drought in the Prairies and allow some insects and diseases to expand their range. Forests could become drier and prone to more forest fires. In urban areas, heat-related deaths could increase due to hotter summer temperatures. Rising temperatures would particularly threaten our fragile arctic ecosystems.[6]

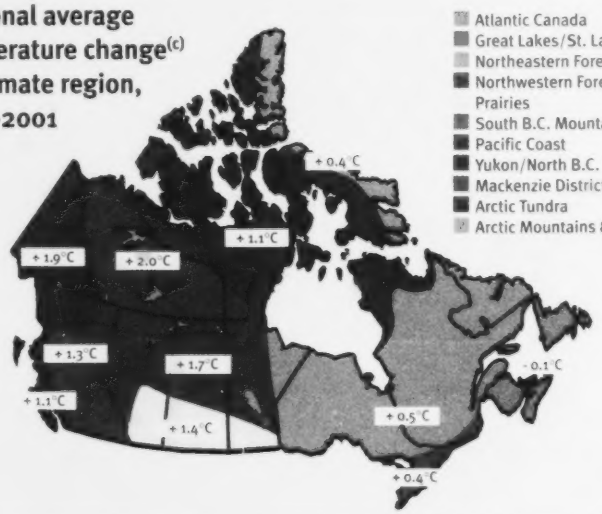
Related indicators

- Emissions of NO_x and VOC (pg. 4)
- Emissions of SO_2 (pg. 8)
- Stratospheric ozone layer thickness (pg. 9)
- Generation of non-hazardous solid waste (pg. 13)

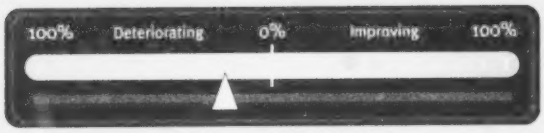
What the Government of Canada is doing

As a member of the 1997 Kyoto Protocol, Canada commits to reducing its greenhouse gas emissions to 6% below 1990 levels by 2012. To help meet this target, the federal government announced 45 initiatives in November 2001 and 2002 that will cut Canada's emissions by roughly 50 megatonnes by 2010. The projects are funded as part of the $1.6 billion in climate change commitments made in Budget 2000 and 2001 and the *Action Plan 2000 on Climate Change*.[7] The initiatives target key sectors such as transportation, energy technology, commercial and residential buildings, forestry and agriculture.

Regional average temperature change[c] by climate region, 1948-2001



Source: Climate Research Branch, Environment Canada.[8]



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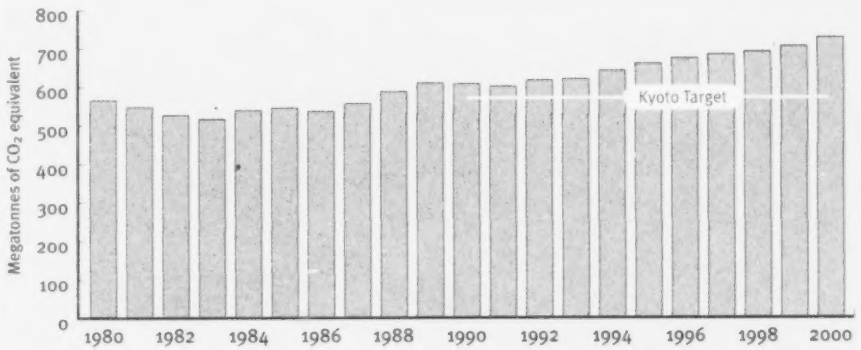

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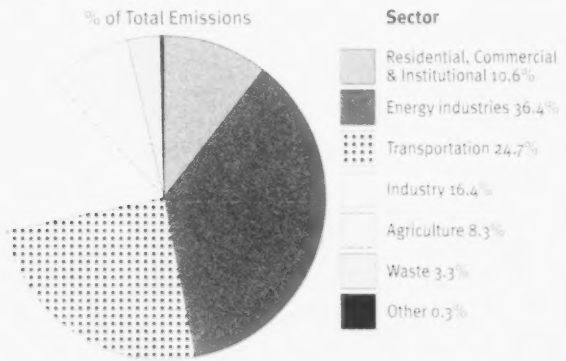

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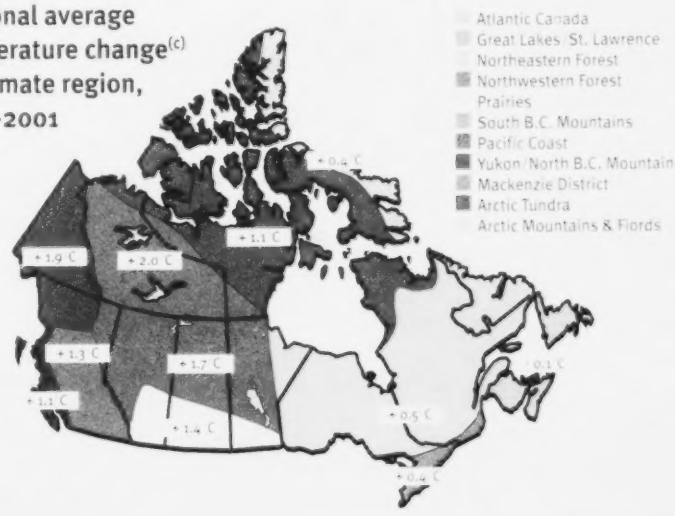

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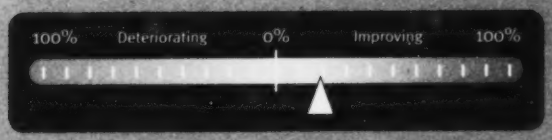
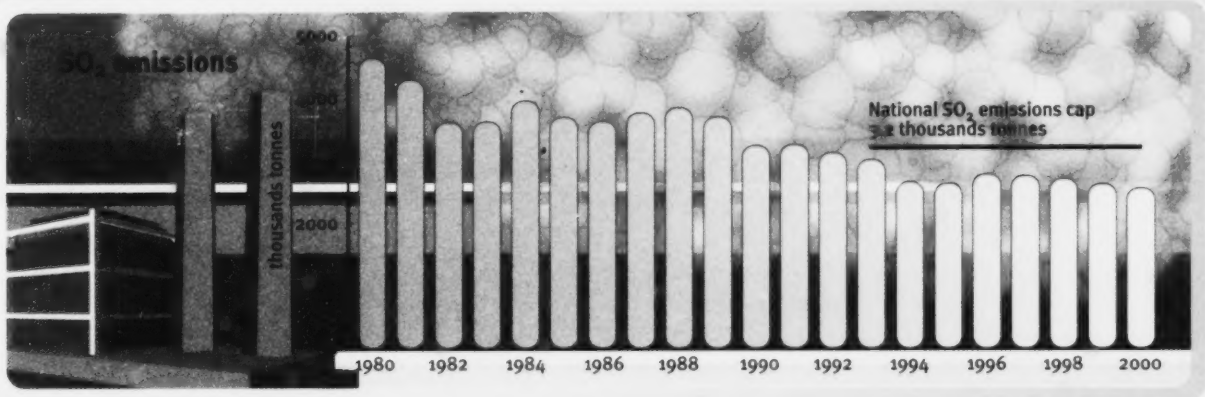


Acid Rain

What is the issue?

Acid rain consists of rain, snow or fog that is polluted by acid in the atmosphere. It degrades the quality of our lakes and soils, harms wildlife, corrodes materials, and affects human health. **Sulphur dioxide (SO_2) and nitrogen oxides (NO_x) are the main pollutants forming acid rain, and are mainly produced by burning fossil fuels.** Most SO_2 emissions come from smelters and power stations, while NO_x emissions are mainly produced by motor vehicles. These pollutants can travel great distances in the atmosphere and are often blown eastward with the winds.[1] Acid rain is particularly a problem in Eastern Canada because many of the water and soil systems in this region cannot neutralize acid naturally.



Source: Pollution Data Branch, Environment Canada.[2]

What is happening?

SO_2 emissions are 54% lower than 1980 levels in the seven easternmost provinces[(a)]. In 2000, total Canadian SO_2 emissions were 21% below the national cap of 3.2 million tonnes per year. Despite progress, acid rain continues to affect our ecosystems.[3]

Why is it important?

Acid rain dissolves nutrients and helpful minerals in the soil and washes them away before trees can use them to grow. Lakes exposed to acid rain become acidified, often leading to the death of many small organisms, frogs, and fish.

Challenge

A large area of eastern Canada continues to receive twice as much acid rain as the local lakes and wetlands can tolerate. Advances in science have shown that SO_2 emission reductions of up to 75% beyond current programs in Canada and the United States are required to protect the environment from acid rain.[4]

Related Indicators

- NO_x and VOC emissions (pg. 4)
- Emissions of smog component (pg. 5)
- Greenhouse gas emissions (pg.6)

What you can do

Conserving energy can reduce emissions of the gases that cause acid rain and can save you money:

- **Use the EnerGuide[6] labels to choose major home appliances with the lowest energy consumption ratings.**
- **Compact fluorescent bulbs use about 75% less energy than incandescent light bulbs and last 10 times longer.**
- **In summer, dry your clothes outside instead of in the dryer.**

What is the Government of Canada doing

The Canada-Wide Acid Rain Strategy for Post-2000 lays out a framework to resolve the acid rain problem mainly through further SO_2 emissions reductions in eastern Canada and the US.[5] Ontario, Quebec, New Brunswick and Nova Scotia have agreed to additional SO_2 emission cuts of 50% beyond their existing caps. Further reductions in NO_x and SO_2 will result from implementation of the commitments in the Ozone Annex to the 1991 Air Quality Agreement and measures to reduce transboundary pollution.

Stratospheric Ozone Layer

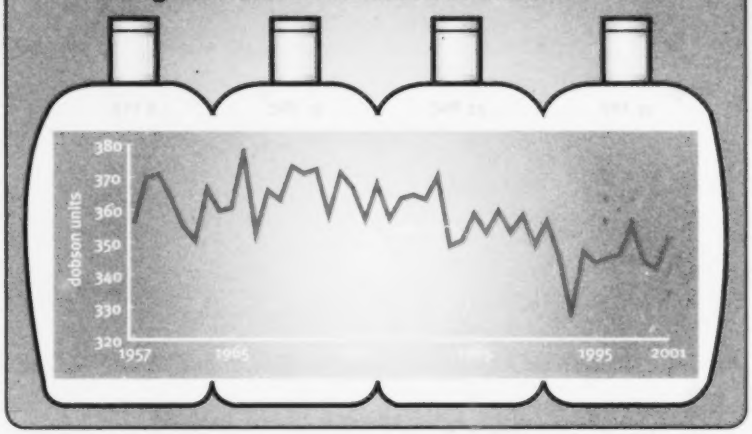
What is the issue?

Ozone, a gas that is chemically related to oxygen, is primarily found in the stratosphere, a layer of the atmosphere located 15-35 km above the Earth's surface. This "layer" of ozone acts as a natural filter for harmful ultraviolet (UV) radiation. Since the late 1970s, a thinning of the ozone layer has been recorded over the entire globe, especially over the poles. The main cause of ozone depletion is the release of industrial chemicals that break down ozone in the stratosphere. These ozone depleting substances (ODS) are sometimes used in air conditioners, refrigeration equipment, aerosol sprays, foam plastics, fire extinguishers and pesticides. Some ODS are also powerful greenhouse gases.

What is happening?

Stratospheric ozone levels have generally declined since the late 1970s. The average ozone level was 2% lower than pre-1980 levels in 1998 and 6% lower in 2000. Even small reductions in ozone layer thickness can have significant effects. Much progress has been made in reducing ODS emissions worldwide, but ozone levels will continue to be affected for many years by ODS already in the atmosphere.

Stratospheric ozone layer thickness:
Average annual ozone level over Canada



Source: Meteorological Service of Canada, Environment Canada.[1]

Why is it important?

Lower ozone levels allow more UV radiation to reach the Earth's surface. UV exposure can lead to sunburn, skin cancer, eye damage, weakening of the immune system, reduced yields of some agricultural crops, and ecosystem damage.

Challenge

Recovery of the ozone layer could occur within the next 50 years, but recent research suggests such recovery could be delayed by the effects of climate change.[2]

Related indicators

- Greenhouse gas emissions (pg. 6)

What you can do

- **Purchase halon-free fire extinguishers.**
- **When refrigerators, freezers and air conditioners are serviced, request that CFCs be recovered and recycled.**
- **Watch for Environment Canada's UV Index in your daily weather forecast and be extra careful of sun exposure on high UV days.**

What the Government of Canada is doing

Canada played a key role in developing the Montreal Protocol, an international agreement to protect the ozone layer, requiring the gradual phase-out of ODS. Canada has had much success in phasing out the use of ODS. In 2000, Canada's ODS production and consumption were 96% lower than the peak value in 1987. The Government of Canada's ozone research and monitoring programs have made major contributions to the global understanding of the ozone layer. In 1992, Canada developed the UV Index to describe the strength of the sun's UV rays, and became the first country to issue nation-wide daily UV forecasts.

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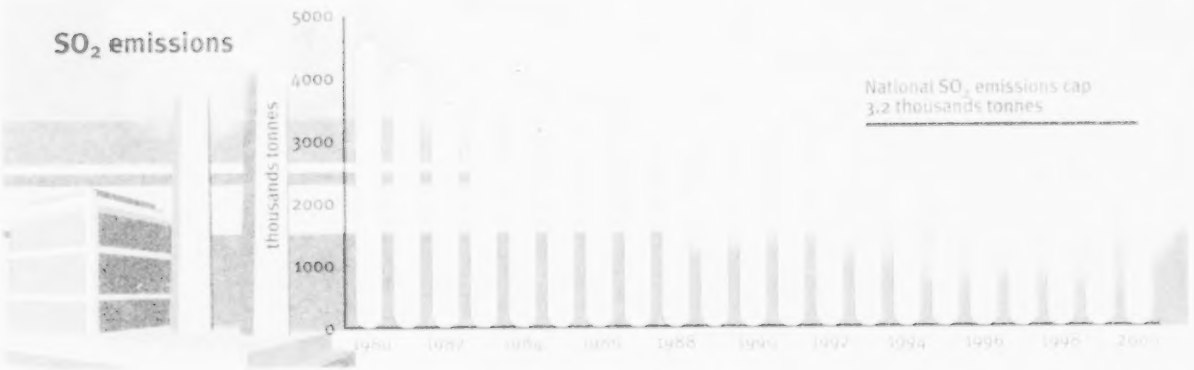

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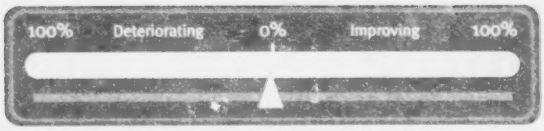

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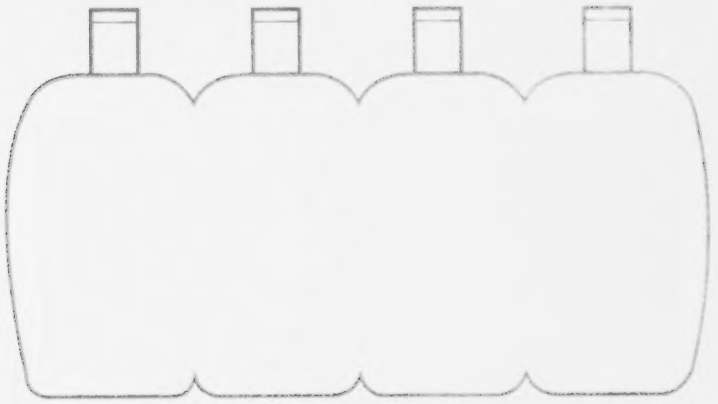


What is the impact?

Lower ozone levels allow more UV radiation to reach the Earth's surface. UV exposure can lead to sunburn, skin cancer, eye damage, weakening of the immune system, reduced yields of some agricultural crops, and ecosystem damage.

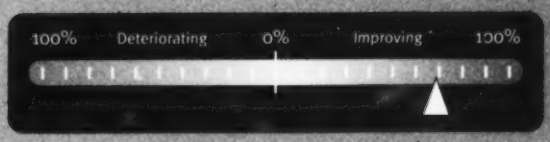
Recovery of the ozone layer could occur within the next 50 years, but current research suggests this recovery may be delayed by the effects of climate change.

What is Canada doing?

Canada played a key role in developing the Montreal Protocol, an international agreement to protect the ozone layer, requiring the phase-out of ODS. Canada has taken action – starting with the use of ODS in Canada – to control ODS production and consumption, to prevent the release of ODS to the environment, to promote the recovery and recycling of ODS, and to encourage the development of substitutes. Canada's contributions to the global understanding of the ozone issue have helped the UV Index program to provide people around the world with daily UV forecasts.

What can you do?

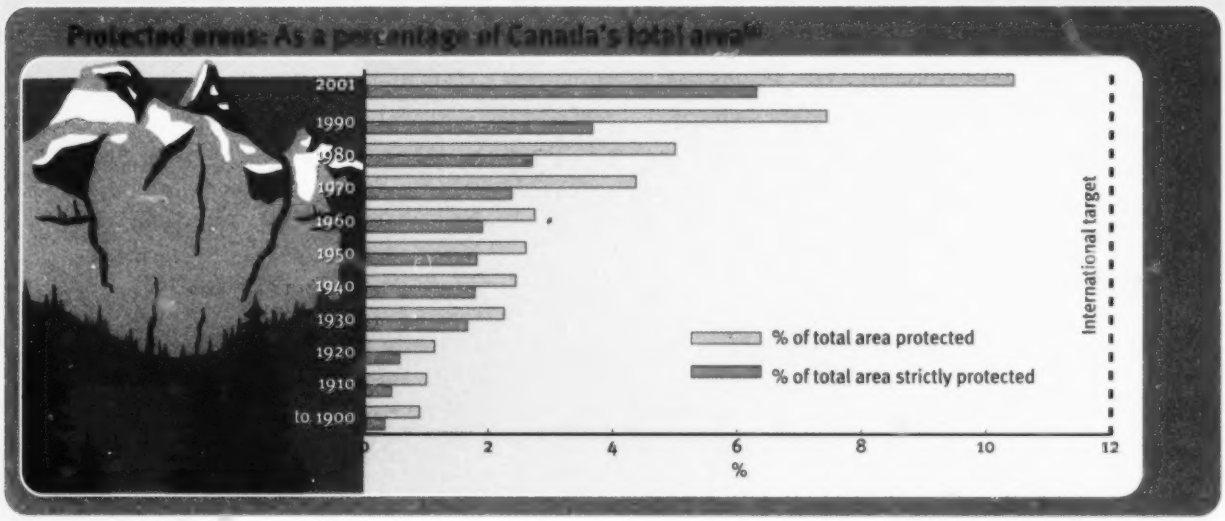
- Purchase halon-free fire extinguishers.
- When refrigerators, freezers and air conditioners are serviced, request that CFCs be recovered and recycled.
- Watch for Environment Canada's UV Index in your daily weather forecast and be extra careful of sun exposure on high UV days.



Wildlife & Wilderness

What is the issue?

Biological diversity, or "biodiversity" for short, describes the variety of plants, animals, and other lifeforms on Earth. It includes diversity within species, between species, and of ecosystems. **Biodiversity in Canada is increasingly under pressure from human influences. These include urban sprawl, deforestation, exotic species introductions, over-harvesting and pollution.** The greatest threat to biodiversity in Canada is the alteration of habitat. Extinction is natural, but the current rate of species loss is far above natural levels.



Source: Canadian Conservation Areas Database.[1]

What is happening?

Protected areas are managed areas dedicated to the protection and maintenance of biodiversity and of natural and cultural resources.[2] Total area protected in Canada continues to increase. To date, over 1,044,000 km² of land have been protected by the federal government, provinces and territories. Parks, wilderness areas and habitat and species protected areas make up the largest portions of this total.

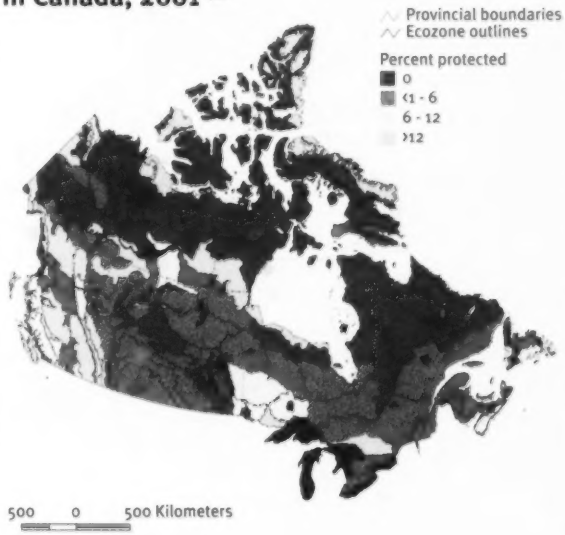
Why is it important?

Protection of habitat (wetlands, forests, plains, lakes, etc.) is key to maintaining and preserving wildlife. When habitat is destroyed, wildlife may become at risk.[3]

Challenge

To ensure a portion of each of Canada's ecological regions is protected and maintain the integrity of our parks. For some habitats, it is important to protect large tracts of land in order to maintain migration routes, foraging areas, and the integrity of the ecosystem. Many of Canada's protected areas are small.

Strictly protected ecoregions in Canada, 2001 [b]



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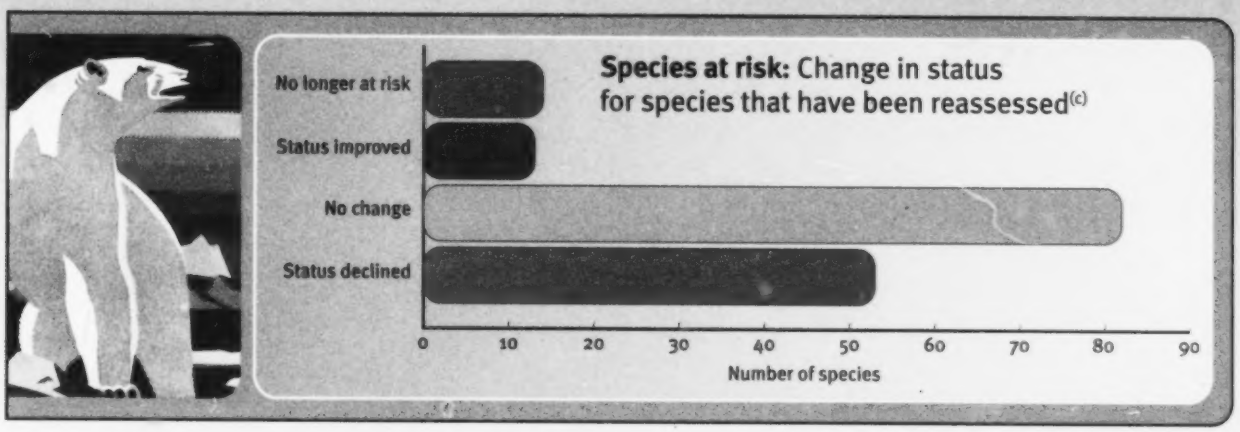
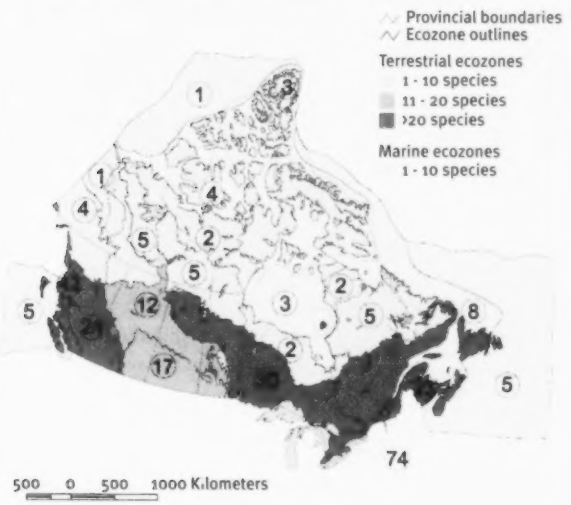


Source: Committee on the Status of Wildlife in Canada.[5]

What you can do

Consider donating some of your property to a local conservation agency (land trust or conservation authority). You'll receive a break on your income tax, reduce your taxable capital gains, and leave a legacy for future generations to enjoy.

Number of endangered and threatened species, subspecies, and populations in each of Canada's ecozones, May 2001



Source: Species at Risk Branch, Environment Canada.[8]

What is happening?

Despite hard work, only a small fraction of Canada's approximately 71,000 species has been studied in depth.[6] Of the species at risk that have been identified since 1978, the status of nearly twice as many species has gotten worse than those that have improved. Since the 17th century, 30 species have disappeared in Canada. There are currently 402 species at risk in Canada.[7] Most occur in areas associated with human activity.

Why is it important?

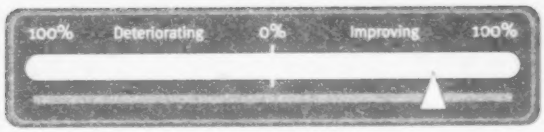
The diverse lifeforms found on Earth play a key role in maintaining our landscapes, climate and water systems. Loss of species may affect our economic potential, limit discoveries of new medicines, and impair the Earth's ability to provide essential services. Many Canadians regard biodiversity as intrinsically valuable.

What the Government of Canada is doing

In 1996, the Canadian Biodiversity Strategy was created by federal, provincial and territorial governments as a guide for biodiversity protection in Canada. The federal Species at Risk Act (SARA) aims to protect wildlife at risk, with the objective of helping their numbers recover by ensuring that critical habitats are protected. Wild Species 2000 is an on-going effort across jurisdictions to report on all wild species in Canada.[9] The federal, provincial and territorial governments signed an accord to protect species at risk. This has resulted in a commitment to report on the status of all species every five years.

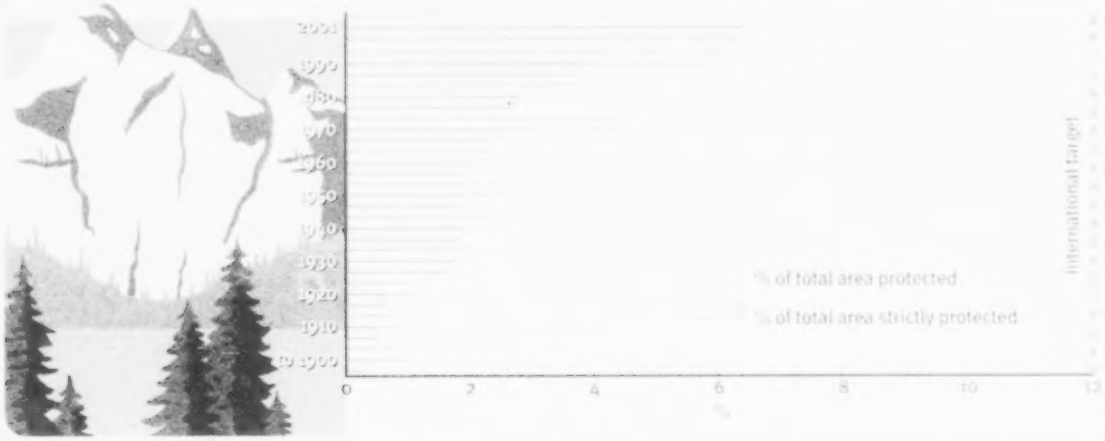
Related indicators

- Emissions of selected toxic substances (pg. 12)
- Canadian temperature variations (pg. 7)



Biological diversity, or "biodiversity" for short, describes the variety of plants, animals, and other lifeforms on Earth. It includes diversity within species, between species, and of ecosystems. **Biodiversity in Canada is increasingly under pressure from human influences. These include urban sprawl, deforestation, exotic species introductions, over-harvesting and pollution.** The greatest threat to biodiversity in Canada is the alteration of habitat. Extinction is natural, but the current rate of species loss is far above natural levels.

Protected areas: As a percentage of Canada's total area[a]

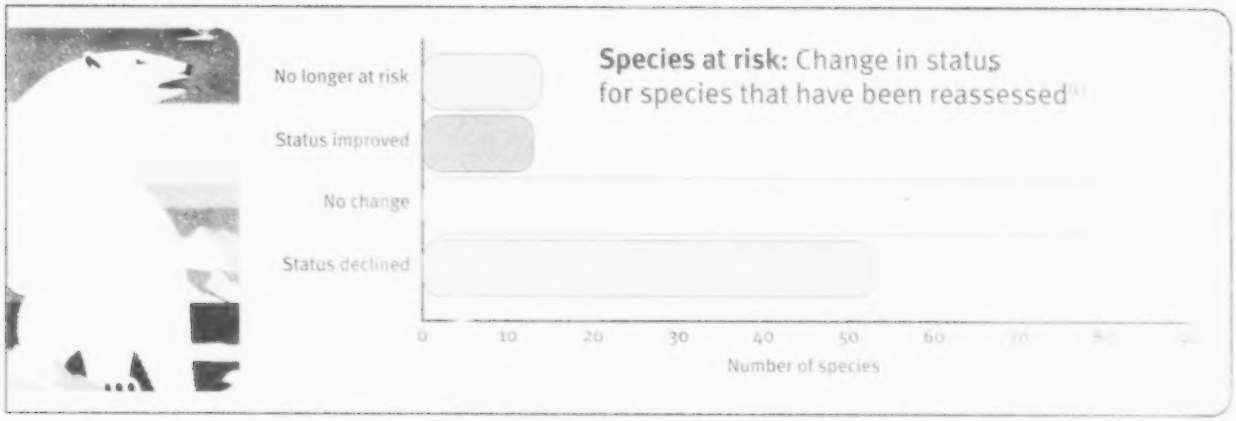


Protected areas are managed areas dedicated to the protection and maintenance of biodiversity and of natural and cultural resources. Total area protected in Canada continues to increase. To date, over 1,044,000 km² of land have been protected by the federal government, provinces and territories. Parks, wilderness areas and habitat and species protected areas make up the largest portions of this total.

Protection of habitat (wetlands, forests, plains, lakes, etc.) is key to maintaining and preserving wildlife. When habitat is destroyed, wildlife may become at risk.

To ensure a portion of each of Canada's ecological regions is protected and maintain the integrity of our parks. For some habitats, it is important to protect large tracts of land in order to maintain migration routes, foraging areas, and the integrity of the ecosystem. Many of Canada's protected areas are small.

Strictly protected ecoregions in Canada, 2001[b]



Consider donating some of your property to a local conservation agency (land trust or conservation authority). You'll receive a break on your income tax, reduce your taxable capital gains, and leave a legacy for future generations to enjoy.

Number of endangered and threatened species, subspecies, and populations in each of Canada's ecozones, May 2001

100% Deteriorating 0%

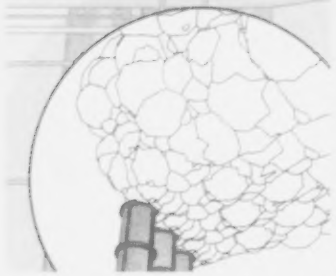
UNDER CONSTRUCTION

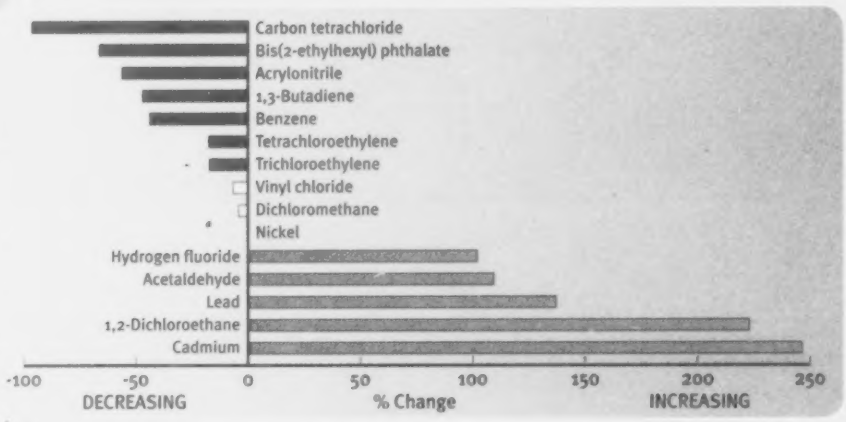
Toxic Substances

What is the issue?

There are approximately 23,000 chemicals currently approved for use in Canada. The *Canadian Environmental Protection Act 1999* (CEPA 1999) defines a substance as 'toxic' if it enters the environment in a quantity that has or may have a harmful effect on the environment, human life, or health.[1] Toxic substances come from many industrial, agricultural, and domestic sources, and once released into the environment can be dispersed to remote regions in air and water currents.

Emissions of selected toxic[a] substances, 1995 to 2000





Source: National Pollutant Release Inventory, Environment Canada.[2]

What is happening?

Trend data is available in the National Pollutant Release Inventory (NPRI) for releases of 16 toxic substances. Of these, on-site releases have increased for 5, remained the same for 3, and decreased for 8 since 1995. Important progress has been made in controlling releases of toxic substances in recent years. For example, mercury emissions to air saw an overall decrease of 35% from 1995 to 2000.[3] Ambient concentrations of benzene in air also decreased by 35% over the same time period.[4] However, releases of some toxic chemicals are increasing.

Why is it important?

Toxic substances can be harmful to the environment, wildlife, and human health. Some toxic substances cause cancer while others may harm reproductive or immune systems, among other effects.

Challenge

More work must be done to understand and limit the risks posed by the thousands of chemicals released into the environment. Governments, industry and communities have to work together to address this challenge.

What you can do

- Buy non-hazardous or least-hazardous paints, solvents, and cleaners. Look for the EcoLogo[6] to identify products that are less environmentally harmful.
- Check the NPRI at http://www.ec.gc.ca/pdb/npri/ to monitor releases of pollutants in your community.

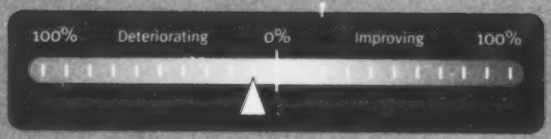
What the Government of Canada is doing

The Government of Canada takes a risk-based approach to assessing and managing toxic substances. Over 10,000 substances have been evaluated since 1986 under the New Substances Program. CEPA 1999 provides tools to protect human health and the environment, establishes strict deadlines for controlling toxic substances and requires the virtual elimination of certain toxic substances.[5] The federal government, in partnership with the provinces and territories, is working to reduce toxic emission through measures such as Canada-wide standards, voluntary initiatives, and regulations.

Related Indicators

- Population served by secondary and tertiary wastewater treatment (p. 3)
- Emissions of NO_x and VOC (p. 4)

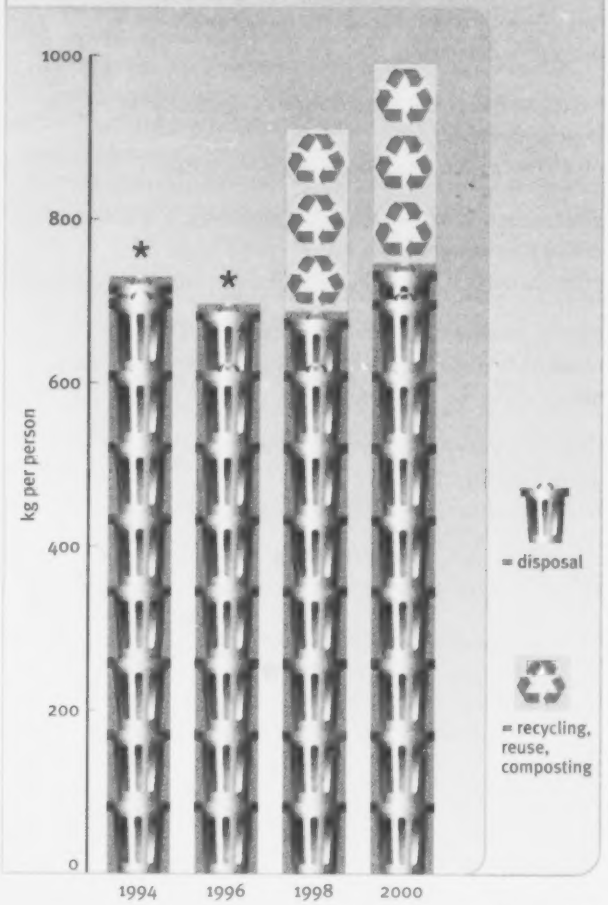
Waste & Recycling



What is the issue?

The amount of solid waste we generate includes wastes disposed in landfills and incinerators plus wastes diverted for recycling and reuse. The generation and management of solid waste raises important environmental, economic and social issues for Canadians. Solid waste can pollute land, air, and water. Collection and disposal of solid waste costs Canadians billions of dollars per year. Waste diversion (recycling, composting, reuse) reduces the material sent to landfills and lessens the need to extract, process, and produce materials and products, and results in lower greenhouse gas and toxic emissions. Reducing the amount of waste we produce is the most effective way to decrease waste generated.

Generation of non-hazardous solid waste[a]



Source: Statistics Canada.[1]
**Recycling data not available*

What is happening?

Solid waste generation continues to increase, however a large proportion is being recovered for recycling, composting and reuse. Between 1998 and 2000 waste generation rose by 10%. Residential waste accounts for roughly one-third of Canada's total municipal solid waste. The remainder is from industrial, commercial and construction sources.

Why is it important?

Increases in recycling and decreases in waste generation reduces the demand for raw material extraction. The increase in the amount of solid waste diverted decreases the dependency on landfills. Landfills have the potential to cause local environmental impacts. Sustainable waste management practices would result in less impact on the environment.

What the Government of Canada is doing

The Government of Canada has provided funds to improve municipal solid waste management systems in Canada through the Green Municipal Funds program. Most Canadian municipalities and provinces have initiated successful waste diversion programs. These include multi-material recycling and the composting of organic material.

What you can do

- **Buy multi-use rather than disposable items**
- **Fully participate in your municipal recycling and composting programs**
- **Avoid purchasing products with excess packaging**

Challenge

To identify more opportunities to reduce solid waste generation, increase waste diversion from landfill, and practice more sustainable solid waste management practices.

Related indicators

- Wastewater treatment (pg. 3)
- Greenhouse gas emissions (pg. 6)
- Emissions of selected toxic substances (pg. 12)

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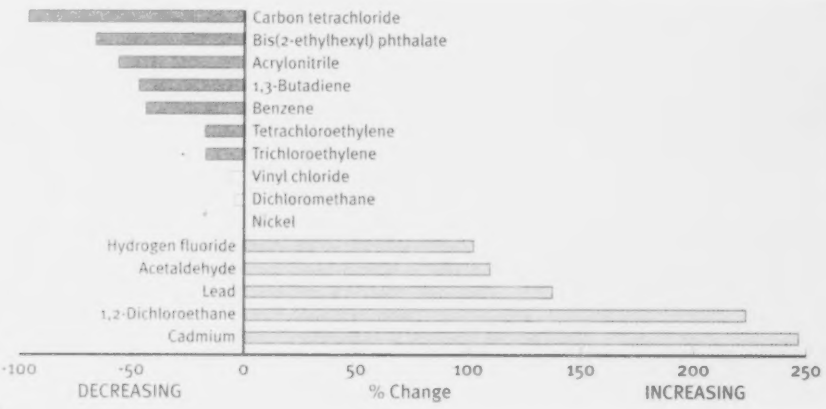

Source: National Pollutant Release Inventory, Environment Canada.[2]

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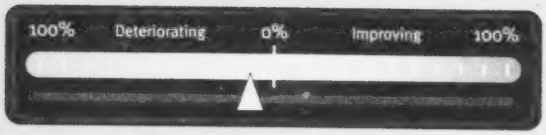

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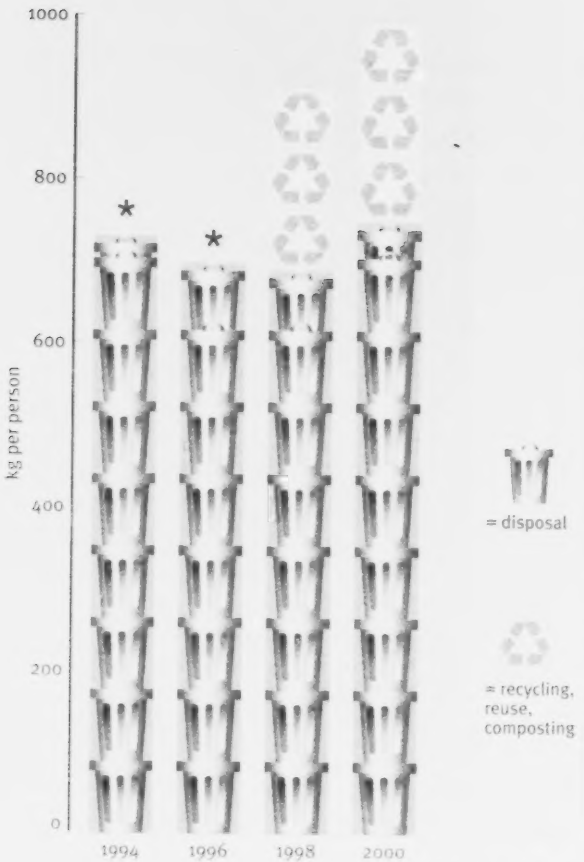

Source: Statistics Canada.
**Recycling data not available*

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Related indicators

- Wastewater treatment (pg. 3)
- Greenhouse gas emissions (pg. 6)
- Emissions of selected toxic substances (pg. 12)

Key Links

Government agencies and their web sites

Government of Canada
http://www.canada.gc.ca/

Sustaining the Environment and Resources for Canadians
http://environmentandresources.gc.ca/

Environment Canada
The Green Lane national home page.
http://www.ec.gc.ca/envhome.html

State of the Environment Infobase
http://www.ec.gc.ca/soer-ree/

What you can do
http://www.ec.gc.ca/eco/main_e.htm

Ecological Monitoring and Assessment Network
http://www.eman-rese.ca/

Atlantic Region
http://www.ns.ec.gc.ca/index_e.html

Quebec Region
http://lavoieverte.qc.ec.gc.ca/envcan/indexe.html

Ontario Region
http://www.on.ec.gc.ca/or-home.html

Prairie and Northern Region
http://www.pnr-rpn.ec.gc.ca/index.en.html

Pacific and Yukon Region
http://www.pyr.ec.gc.ca/index_e.htm

Statistics Canada
http://www.statcan.ca/

Natural Resources Canada
http://www.nrcan-rncan.gc.ca/inter/index.html

Health Canada
http://www.hc-sc.gc.ca/

Agriculture and Agri-Food Canada
http://www.agr.gc.ca/

Sample of Canadian Environmental Indicator Links

National Roundtable on the Environment and the Economy, Environment and Sustainable Development Indicators initiative
http://www.nrtee-trnee.ca/eng/programs/current_programs/sdindicators/

Canadian Policy Research Networks, Quality of Life Indicators Project
http://www.cprn.org/corp/qolip/Default.htm

The Federation of Canadian Municipalities, The FCM Quality of Life Reporting System
http://www.fcm.ca/english/communications/qol2001-e.pdf

International Institute for Sustainable Development, Measurement and Indicators of Sustainable Development
http://www.iisd.org/measure/

York Centre for Applied Sustainability, Measuring Sustainability
http://www.sustreport.org/indicators/index.html

References

Water Use

Notes:

Meter: Percent change between daily municipal water use per capita in 1991 and 1999. (+4%)

a. Water use values are based on (1) municipalities that responded in a given year and (2) a regional-level estimate for all municipalities that did not respond or, in earlier years, were not surveyed. Includes residential, commercial and industrial sectors, plus other unaccounted water uses.
b. The "Other" category includes water lost through leakage; unaccounted water uses, such as water used in firefighting or to flush out pipes; and water that a municipality was unable to assign to one of the other three sectoral categories.

Sources:

1. Environment Canada. 2000. "What is water conservation?", *A primer on fresh water : questions and answers*. Available from http://www.ec.gc.ca/water/en/info/pubs/primer/e_primo3.htm#a16.
2. Environment Canada. 2001. "Daily municipal water use per person in Canada, 1983–1999". Available from http://www.ec.gc.ca/soer-ree/English/Indicators/Issues/Urb_H2O/Tables/uwtbo1_e.cfm. Adapted from *Municipal Water Use Database (MUD)*. Available from http://www.ec.gc.ca/erad/eng/01_4_e.htm.
3. Environment Canada. 2001. "Indicator: Daily Municipal Water Use", *National Environmental Indicator Series*. Available from http://www.ec.gc.ca/soer-ree/English/Indicators/Issues/Urb_H2O/Bulletin/uwind1_e.cfm.
4. Environment Canada. 2001. "Total daily municipal water use by sector, 1983–1999". Available from http://www.ec.gc.ca/soer-ree/English/Indicators/Issues/Urb_H2O/Tables/uwtbo2_e.cfm. Adapted from *Municipal Water Use Database (MUD)*. Available from http://www.ec.gc.ca/erad/eng/01_4_e.htm.

Wastewater Treatment

Notes:

Meter: Percent change of the percentage of the population with secondary and/or tertiary treatment between 1991 and 1999. (+20%)

a. Sewered municipal population. Data does not include municipalities with populations less than 1000, industries that do not use municipal wastewater treatment, or septic systems.
Secondary wastewater treatment: Effluent treatment process that follows primary treatment. A combination of biological or chemical processes with mechanical and/or gravitational methods to remove dissolved, colloidal, and suspended matter.
Tertiary wastewater treatment: Advanced effluent treatment process that further reduces the concentration of suspended and dissolved substances in the secondary effluent by employing physical filtration, chemical precipitation, or biological action.
b. Sewered municipal population. Data does not include municipalities with populations less than 1000, industries that do not use municipal wastewater treatment, or septic systems. Discharge into coastal versus inland (fresh) waters is largely self-reported. The Atlantic coastal waters include municipalities discharging into the St. Lawrence estuary.

Sources:

1. Environment Canada. 2001. "Indicator: Municipal population served by wastewater treatment." *National Environmental Indicator Series*. Available from http://www.ec.gc.ca/soer-ree/English/Indicators/Issues/Urb_H2O/Bulletin/uwind3_e.cfm.
2. Environment Canada. 2001. *The State of Municipal Wastewater Effluents in Canada*. Ottawa: Minister of Public Works and Government Services Canada.
3. Clarkson, Adrienne. 2001. *A Clean Environment*. Speech from the Throne to Open the First Session of the 37th Parliament of Canada. Available from http://www.sft-ddt.gc.ca/sft-ddt/10_e.htm.
Environment Canada. 2001. *The State of Municipal Wastewater Effluents in Canada*. Ottawa: Minister of Public Works and Government Services Canada.

Air Quality

Notes:

Meter: Percent change for a regression of ambient ground-level ozone concentrations from 1990 to 2000 for Eastern (+3%) and Western Canada. (-12%)

a. Includes anthropogenic sources and forest fires.
b. Ground-level ozone values represent the annual composite 4th Highest 8-h Daily Maximum (ppb) for Western Canada (B.C. and Prairie Region) and Eastern Canada (Ontario, Quebec and Atlantic Region). Compliance to Canada-wide standards (CWS) is not mandatory until 2010. CWS will use 3-year averages of the composite 4th Highest 8-h Daily Maximum.

c. Achievement of the CWS numerical level is not required until 2010 and it can only be assessed if the conditions specified in the *Guidance Document on Achievement Determination* have been satisfied, which is strictly not the case for the data in the chart provided. The data in the chart cannot, therefore, be construed as indicating the achievement status of the CWS numerical level.
d. All stations are averages of monthly average ambient values. All are residential suburban sites measured using TEOM monitoring.

Sources:

1. Environment Canada. 2002. *Criteria Air Contaminants Division*, Pollution Data Branch. Updated NO_x and VOC data will be available in 2003.
2. Environment Canada. 1999. "1995 Criteria Air Contaminant Emissions for Canada (tonnes)". Available from http://www.ec.gc.ca/pdb/ape/ape_tables/canada95_e.cfm.
3. Environment Canada. 2002. *National Air Pollution Surveillance Network*. Adapted by the Environmental Technology Centre.
4. Environment Canada. 2002. *National Air Pollution Surveillance Network*. Adapted by the Environmental Technology Centre.

Climate Change

Notes:

Meter: Percent change between Kyoto benchmark (1990 GHG emissions) and 2000 value for Canadian GHG emissions from all sources in CO_2 equivalents. (-20%)

a. "Energy industries" refers to the electricity and petroleum industries. "Other" refers to Land-Use Change and Forestry (methane and nitrous oxide). Industrial emissions includes emissions from solvents and other product use.
b. Southern Canada data represents 10 year averages of annual average temperature variations from a mean using a reference period of 1951–80. Data are to 1998 only. All Canada data represents 5-year averages of annual average temperature variations from a mean using a reference of 1951-1980. Data are to 2000, however 1999 and 2000 data are preliminary.
c. The map represents linear changes in mean temperature for each climate region regressed over the period from 1948 to 2001.

Sources:

1. Environment Canada. 2002. *Canada's Greenhouse Gas Inventory 1990-2000* (in press).
2. Environment Canada. 2002. *Canada's Greenhouse Gas Inventory 1990-2000* (in press).
3. Statistics Canada. 2001. *Annual Demographic Statistics*. Catalogue #91-213.
   Statistics Canada. 2002. *Quarterly Report on Energy Supply-Demand in Canada*. Catalogue #57-003.
   Statistics Canada. 2002. *CANSIM II*, Table 384-0002.
4. Environment Canada. 2002. *Climate Research Branch*, Meteorological Service of Canada.
5. Huebert, Rob, 2002. "Climate Change and Canadian Sovereignty in the Northwest Passage". *Isuma* Vol. 2, No. 4. p. 86-94.
   Government of Canada. 2001. *Canada Country Study*. Available from http://www.climatechange.gc.ca/english/issues/how_will/canada_country.shtml.
6. Environment Canada. 2001. *Climate Change Overview: How Will This Affect You?* Available from http://www.ec.gc.ca/climate/overview_affect-e.html.
7. Environment Canada. 2000. *Government of Canada Action Plan 2000 on Climate Change*. Available from http://www.climatechange.gc.ca/english/whats_new/action_plan.shtml.
8. Environment Canada. 2002. *Climate Research Branch*, Meteorological Service of Canada.

Acid Rain

Notes:

Meter: Percent change in total SO2 emissions between 1991 and 2000. (+19%)

a. Easternmost provinces refers to Manitoba, Ontario, Quebec, New Brunswick, Nova Scotia, Newfoundland and Labrador, and PEI.

Sources:

1. Environment Canada. 2001."Where is acid rain a problem?" *Acid Rain and the Facts*.
   Available from http://www.ec.gc.ca/acidrain/acidfact.html.
2. Environment Canada. 2002. *Pollution Data Branch*.
3. Environment Canada. 2001. "Progress on Specific Commitments" *2000 Annual Progress Report on The Canada-Wide Acid Rain Strategy for Post-2000*.
   Available from http://www.ccme.ca/assets/pdf/acid_rain_e.pdf..
4. Federal/Provincial/Territorial Ministers of Energy and Environment. 1998. *Supporting document for the Canada-Wide Acid Rain Strategy for Post-2000*. Halifax, p. 3-6.
5. Federal/Provincial/Territorial Ministers of Energy and Environment. 1998. *The Canada-Wide Acid Rain Strategy for Post-2000: Strategy and Supporting Document*. Halifax.
6. Natural Resources Canada. 2002. "EnerGuide Appliance Directory 2002", *Office of Energy Efficiency*.
   Available from http://oee.nrcan.gc.ca/appliances/index.cfm.

Stratospheric Ozone Layer

Meter: Linear trend in stratospheric ozone levels over Canada between 1990 and 2000. (-1%)

Sources:

1. Environment Canada. 2002. Meteorological Service of Canada, Downsview, Ontario, Canada.
2. World Meteorological Organization. 1998. "Executive Summary", *Scientific Assesment of Ozone Depletion*: 1998. Global Ozone Research and Monitoring Program, Report No. 44.

Wildlife & Wilderness

Notes:

Meter: Percent change between 1992 and 2001 for strictly protected areas using a linear regression. (+69%)

a. Total protected areas include all areas under IUCN classifications I-VI. Strictly protected areas includes only protected ares under IUCN classifications I-III. These are areas managed mainly for strict protection (i.e. strict nature reserves/wilderness areas), ecosystem conservation and recreation (i.e. National & Provincial Parks), and conservation of natural features (i.e. Natural Monuments).

b. Includes only protected areas under IUCN classifications I-III. The map is current as of May 2001 and includes all endangered and threatened species, subspecies and populations. Does not include changes that have occurred at the November 2001 and May 2002 COSEWIC meetings.

c. The list does not include re-assessments that were based on an existing status report only. These re-assessments were done using the new IUCN criteria and were not based on any new information. Some changes are the result of new information, and not the result of biological changes. Species re-assessments that result in splitting a species into smaller units (i.e. populations) are considered new assessments.

Sources:

1. Canadian Council on Ecological Areas and Parks Canada. 2002. *Canadian Conservation Areas Database*. The database was cleaned and upgraded by GEOAccess Natural Resources Canada Habitat Division of Canadian Wildlife Service and is now being maintained by the Habitat Division of Canadian Wildlife Service, Environment Canada.
2. World Commission on Protected Areas. 2002. *About Protected Areas*. Available from http://wcpa.iucn.org/wcpainfo/protectedareas.html.
3. Environment Canada. 2001. "What is Threatening Nature?" *Environmental Priority – Nature*. Available from http://www.ec.gc.ca/envpriorities/nature_e.htm.
4. Canadian Council on Ecological Areas and Parks Canada. 2002. *Canadian Conservation Areas Database*. The database was cleaned and upgraded by GEOAccess Natural Resources Canada Habitat Division of Canadian Wildlife Service and is now being maintained by the Habitat Division of Canadian Wildlife Service, Environment Canada. Adapted by the National Indicators and Assessment Office, Environment Canada.
5. Environment Canada. May 2002. *Committee on the Status of Endangered Wildlife in Canada (COSEWIC)*.
6. Canadian Endangered Species Conservation Council. 2001. *Wild Species 2000: The General Status of Species in Canada*. Ottawa: Minister of Public Works and Government Services Canada. Available from http://www.wildspecies.ca/en/Report.pdf.
7. COSEWIC. 2002. *Summary of the full list of Canadian species at risk: Risk status according to taxonomic group – May 2002*. Available from http://www.cosewic.gc.ca/pdf/English/Full_List_Species_e.pdf.
8. Environment Canada. May 2001. *Species at Risk Branch*, Canadian Wildlife Service. Adapted by: National Indicators and Assessment Office, Environment Canada.
9. Canadian Endangered Species Conservation Council. 2001. *Wild Species 2000: The General Status of Species in Canada*. Ottawa: Minister of Public Works and Government Services Canada. Available from http://www.wildspecies.ca/en/Report.pdf.

Toxic Substances

Notes:

Meter: Under development.

Sources:

1. Department of Justice Canada. 2001. *Canadian Environmental Protection Act 1999*. Assented to 14th September, 1999. Available from http://laws.justice.gc.ca/en/C-15.31/26784.html.
2. Environment Canada. 2002. *National Pollution Release Inventory*. Available from http://www.ec.gc.ca/pdb/npri/. The 'matched data' for 1995-2000 represent emissions for industrial, commercial and public facilities that submitted reports on a common core of 16 CEPA-toxic substances with consistent reporting requirements in the NPRI. The NPRI collects information on pollutants released to air, water, land and underground injection and those transferred for disposal. Only facilities with total hours worked by all employees over 20,000 hours and fit other criteria are required to report, with some exceptions.
3. Environment Canada. 2002. *Comprehensive Mercury Inventory*.
4. Environment Canada. 2002. *National Air Pollution Surveillance Network*. Adapted by the Pollution Data Branch, Environment Canada. Calculated using the composite average of site annual mean benzene concentrations for each year for 21 sites in 11 cities across Canada.
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Waste & Recycling

Notes:

Meter: Percent change between 1998 and 2000 for total waste generated. (-10%)

a. The indicator is calculated from the kilograms/capita/year to account for annual increases in population. This provides a more accurate account of residential solid waste figures.

Sources:

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